

GO COMMITTEE #4
January 22, 2015

MEMORANDUM

January 20, 2015

TO: Government Operations & Fiscal Policy (GO) Committee
FROM: ^{GO} Glenn Orlin, Deputy Council Administrator
SUBJECT: Follow-up discussion—Inspector General Report 14-007: Project Management Deficiencies in Constructing the Sarbanes Silver Spring Transit Center

On May 15, 2014 the Council received the Office of Inspector General's report describing deficiencies by the Department of General Services (DGS) in its management of the Silver Spring Transit Center. The report (including a separate report by its consultant, Alpha Corporation, entitled Analysis of Project Controls) was distributed to Councilmembers last spring. Inspector General Edward Blansitt and Deputy IG Michael Morgan will be present at the briefing.

The Report in Brief (i.e., executive summary) is on ©1-8; the Chief Administrative Officer's response to the IG's eight recommendations is on ©9-13. The full IG report can be found here: http://www.montgomerycountymd.gov/OIG/Resources/Files/PDF/IGActivity/FY2014/mcdgs_sstc_final_report_main_15_apr_2014.pdf. Alpha Corporation's report can be viewed from this link: http://www.montgomerycountymd.gov/OIG/Resources/Files/PDF/IGActivity/FY2014/mcdgs_sstc_final_report_exhibit_1_15_apr_2014.pdf.

The IG's powerpoint presentation is on ©14-20. Executive Branch staff will also attend this discussion.

https://mcgov-my.sharepoint.com/personal/orling_montgomerycountymd_gov/documents/150122go-ig.doc

Report in Brief

Project Management Deficiencies in Constructing the Paul S. Sarbanes Silver Spring Transit Center

April 15, 2014

Background

The Paul S. Sarbanes Silver Spring Transit Center (SSTC) is a ground transportation facility located in downtown Silver Spring, Maryland at the intersection of Colesville Road and Wayne Avenue.¹ It was designed to accommodate bus and taxi movements while loading and unloading passengers. Bus loops are located on the ground (Level 305) and second (Level 330) floors, while private vehicles and taxis use the third, smaller floor (Level 350). The Levels 330 and 350, which are the focus of this report, are made of concrete reinforced with mild steel reinforcing bars and post-tensioned tendons (a post-tensioned tendon consists of 7 high strength wires braided together to form one tendon) embedded in the floors to provide strength.

Under a formal Memorandum of Understanding (MOU) dated November 17, 2004 (amended and restated September 25, 2008) between the two owners of the land being used for this project - Montgomery County Maryland and Washington Metropolitan Area Transit Authority (WMATA) - Montgomery County, represented by its Department of General Services (DGS), is authorized to manage the development and construction of the SSTC. Upon completion of the project and WMATA's acceptance and approval, WMATA will control, operate, and maintain the facility.

Construction of the structure began in 2009 but project progress was severely delayed due to unforeseen contaminated soil and utility relocations. By June 2010, the project was already several months behind schedule. By November 2010, visible evidence of structural issues and concerns about durability had emerged, including:

- Cracks discovered in the concrete slabs, beams and girders;

¹ For additional background information about the SSTC, reference the *Silver Spring Transit Center Structural Evaluation of Superstructure* report dated March 15, 2013, prepared by KCE Structural Engineers, PC., pp. 3-4, and the *Evaluation of Silver Spring Transit Center, Silver Spring, Maryland* report dated May 2, 2013, prepared by Whitlock Dalrymple Poston & Associates, Inc., page 1.

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- Concrete that broke away from the finished drive surface (spalling), revealing post-tensioned tendons and evidencing that an insufficient concrete cover had been placed over the tendons;
- Issues related to post-tensioned tendon elongations and tensioning; and
- Reinforcing bars that were incorrectly installed or partially omitted in a slab pour.

Although concerns about concrete thickness, inadequate concrete cover, and related structural deficiency and durability were continually raised in monthly project oversight meetings, potential repairs and remediation had not been resolved by the end of the major construction activities in 2012.

Project oversight was provided based on a formal Project Management Plan (PMP) by a Project Management Team (PMT) consisting of representatives of all major project stakeholders, including the property owners, Montgomery County and WMATA, and the state and federal government agencies that provided significant funding for the project (the Maryland Transit Administration [MTA] and the Federal Transit Administration [FTA]). The team held formal monthly meetings for which meeting minutes were kept. In April 2012 DGS reported to the PMT that the construction contractor would prepare a presentation regarding a remediation plan. Recommended actions, including a 2 inch Latex Modified Concrete (LMC) overlay, recommended by Parsons Brinckerhoff, Inc. (PB) and MTA in mid-2012, were proposed during the following months, but meeting minutes indicate “WMATA has not accepted this proposed fix and continues to question the root cause of the cracks.”

In June 2012, Montgomery County contracted with KCE Structural Engineers, P.C. (KCE) to conduct a document review and structural evaluation of in-situ conditions at the SSTC. In July 2012, the firm of Whitlock Dalrymple Poston & Associates, P.C. (WDP) was retained by WMATA to evaluate the SSTC. Both evaluations had similar purposes - to determine the condition of the SSTC and to understand whether the structure as constructed satisfied the strength and durability requirements necessary to meet its intended use and service life. Both KCE and WDP based their findings on independent document reviews, field investigation observations, and engineering analyses.

On March 15, 2013 KCE issued its report that identified a number of serious deficiencies in the structure, and determined that the SSTC required strengthening and repairs to meet Building Code and WMATA requirements. On May 2, 2013, WDP released its report which documented construction deficiencies consistent with those identified in the KCE report.

As of March 2013, when the KCE report was issued, information we were provided by FTA indicated that total project cost stood at \$104,618,000. However, approximately \$7,000,000 in change orders were pending. FTA had provided \$53,957,000. The balance had been provided by the MTA and Montgomery County. The initial estimate in 2004 was \$35 million.

Why We Did This Inspection

The objective of our Inspection was to identify and document any project management deficiencies during the construction of the Silver Spring Transit Center. In achieving our objectives, we attempted to determine which project management controls failed, how these controls should have functioned, why they failed, and what measures should be taken to ensure controls will be effective in future projects undertaken by Montgomery County.

A report on the Silver Spring Transit Center entitled "Analysis of Project Controls" was prepared at our request by the Alpha Corporation. That report, which includes both recommendations and lessons learned, is included in its entirety as Exhibit I. The **objectives, scope, and methodology** of our report are provided in Exhibit II.

What We Found

The significant structural strength and structural durability concerns identified in both the KCE and WDP Reports resulted from deficiencies in construction, design issues cited in the KCE report, and failure to effectively address these issues when they were first identified. Each of these issues contributed to widespread cracking in the slabs, beams, and girders that is now evident in the Silver Spring Transit Center.

Project Controls (see page 11)

Fourteen of the 22 relevant construction project controls analyzed for adequacy of design, implementation, and effectiveness were either weak or ineffective.

Structural Strength (see page 13)

Concrete compressive strength (page 13) as measured by KCE is weaker in some areas than required by the contract documents. Although inspectors asserted that no undocumented water was added to the concrete, forensic testing in the SSTC suggests a presence of 36% more water than was documented by the concrete provider and the inspector.

Specifically, testing for the workability of concrete via slump measurements provided an indicator of additional water. Concrete with greater workability was documented for 19% of the second slump tests taken on the deck – a result that is inconsistent with the passage of time and the asserted absence of undocumented additional water. These results raise questions about the

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accuracy and validity of the recorded data, as the results are inconsistent with the other data. Greater amounts of water in a concrete mix would contribute to lesser compressive strength.

We found evidence that concrete did not cure properly in some areas, further impacting the compressive strength of the concrete placed in the structure (in-situ concrete). The condition of the in-situ concrete may have been affected by the failure to observe cold weather curing procedures, potentially contributing to the early shrinkage cracking observed in the structure. The placement of thermal protection was delayed and prematurely discontinued during some cold-weather pours, and temperatures were not monitored as indicated in the specifications.

The effects of extra water and improper curing should have been detected during testing, but concrete specimen samples upon which test results relied were not representative of the in-situ concrete.

Most specimen cylinders were collected at the construction site inspection station. For three trucks during each pour, however, comparative specimens were also collected on the deck where the concrete slabs were poured. Compressive strength tests relied upon for decision-making were primarily those from specimen cylinders collected and cured at the inspection station.

We found that for 49 of the 56 comparative specimen sets, cylinders collected from the deck slab pours demonstrated lower compressive strength than that of the cylinders taken at the inspection station. However, records do not indicate that the test results from cylinders collected at the two locations were ever compared by the contractors. As a result, the differences were not identified or investigated, and the same batch performance differences relative to specifications were not detected.

Concrete placement (page 34) resulted in insufficient concrete cover over reinforcing steel and post-tensioned tendons, which allowed the concrete covering tendon ducts in several locations to crack away when grout was placed in the ducts. Concrete drive paths as poured do not provide the minimum concrete cover (thickness) required by the design specifications. In other areas, the concrete cover was thicker than design specification requirements.

By late 2010, design, construction, and inspection personnel were aware that proper concrete thickness was not always being achieved, yet effective corrective measures were not taken, and the problem persisted throughout the period of the major construction project activities.

The three pour strips² (page 37) on the 330 and 350 levels were each constructed in a different manner and neither of the pour strips on the 330 level was constructed in a manner that conformed to the design requirements identified in the structural drawings. The Contractor's Quality Control plan provided for resolution of construction questions through a written process, but the contractor did not use this process to seek answers to questions it may have had about design requirements. The east pour strip on the 330 level was poured without post-tensioning tendons but with mild

² Pour strips are areas of a slab in the deck that are left out during construction and then placed after adjacent concrete has been poured and has been allowed an opportunity to shrink. See Finding 6.

steel reinforcement, while the west pour strip on the 330 level was poured without post-tensioning tendons and without sufficient steel reinforcement in one direction.

Pour strip deficiencies resulted from the failure to prepare necessary and/or accurate shop drawings and professional errors in detecting the omission and inaccuracy of the drawings.

Durability of the Structure (see page 42)

Water penetrating the structure through the cracks could reach and corrode the embedded reinforcing steel, thus potentially shortening its life span significantly from the intended 50-year life. Significantly greater maintenance of the structure would be required, thus greatly increasing the cost of maintaining the structure through its projected life.

The primary causes of the reduced durability include widespread cracking of various sizes throughout the structure, which are attributable to the design of the structure that according to KCE and WDP was not prepared in accordance with applicable building codes, WMATA design criteria, or industry standards. A major issue was the lack of construction and design details to accommodate normal movement.

Although evaluation of The Robert B. Balter Company (Balter) (the project inspector) compressive strength testing of the sample cylinders led PB to determine that concrete had attained the 4,000 psi minimum strength necessary to commence post-tensioning stressing, the findings of this report conclude that in-situ concrete was likely less mature and of questionable strength at the time stressing commenced. Cracking observed during the first month following concrete placement appears consistent with drying and shrinkage resultant from improper curing, and the horizontal cracking in the beams and girders documented by KCE during its testing is likely resultant from excessive stressing force applied to immature concrete.

However, after this initial setting and curing period whose passage is approximated by the 28-day compressive strength tests, existing cracks worsened, and new cracking appeared. We have found no evidence that the cracking that persisted after the 28 day period could have resulted from any cause other than design issues.

Problems with structural design and construction were identified by late 2010, and repeatedly discussed in subsequent Project Management Team meetings, but were not effectively addressed.

In a reactive response to problems that were identified during construction, DGS contracted with an independent firm, KCE, but did not do so until 2012, when the structure was almost complete.

In hindsight, the County would have benefitted from retaining an objective third party firm to perform a "peer review" function during the design of the structure.³ That firm could have been retained to work with the design professionals to either substantiate or modify the design.

³ See discussion of Peer Review in Finding 7.

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The County also would have benefitted from retaining an objective third party firm to perform the Construction Management function during the construction.

Structural Remediation (see page 53)

As a follow-up to a meeting held on April 25, 2013, a Cooperative Remediation Working Group (CRWG)⁴ was formed to develop a plan to remediate the defects at the SSTC with a resultant structure that meets the design and operational objectives and standards outlined in the project documents.

The CRWG quickly agreed upon, designed, and implemented corrective actions to strengthen both of the Level 330 pour strips. Those actions were completed by the end of 2013. The CRWG also adopted a plan to fill slab cracks and resolve the slab thickness deficiencies by topping the Level 330 and 350 slabs with a Latex Modified Concrete (LMC) overlay that will be applied once the weather and temperatures permit, and decisions about other remedial actions necessary to address durability issues have been made. As of the mid-April 2014, the CRWG had not agreed upon a remediation plan to address the latter issues.

What We Recommend

Recommendation 1: DGS should improve its controls for future projects in a manner that is consistent with the lessons learned and additional recommendations contained in Exhibit I, the report "Analysis of Project Controls," in addition to other recommendations made in this report.

Recommendation 2: DGS should ensure construction documents clearly establish responsibility for and performance of systematic analysis of data collected and recorded during construction in order to identify possible inconsistencies with specifications, project control weaknesses, and construction deficiencies that should be investigated and resolved.

Recommendation 3: In future projects, DGS should ensure that all specification requirements are reviewed and implemented unless a variance is mutually discussed and agreed upon. Temperature limits during curing should be monitored and maintained, and specification for duration of curing should be strictly observed. Confusion about where to take samples and about cold weather limits should be avoided by clearer language in

⁴ The CRWG is comprised of key participants in the SSTC project, representing Montgomery County, the Federal Transit Administration, the Maryland Transit Administration, the Washington Metropolitan Area Transit Authority, Parsons Brinkerhoff, Foulger Pratt, and KCE, as well as their respective consultants and subcontractors.

specifications. Any conflicts between specifications and standards should be resolved in favor of the more conservative of those required by stakeholders (in the case of the SSTC, the stakeholders are DGS, and WMATA).

Recommendation 4: DGS should modify its contract specifications for future construction projects to ensure that concrete test specimens are made as near as possible to the actual point where concrete is placed. Where referenced standards require testing at the point of delivery, DGS should clarify in the specification that such testing is in addition to typical testing.

Recommendation 5: In future projects, DGS should ensure its construction contractors utilize a construction method that allows direct measurement of floor thickness so that inspectors can help the Contractor by identifying problems before the concrete is placed. Alternatively, a second, independent survey should be performed. Survey equipment could be utilized by inspectors to continuously monitor concrete thickness during placement, and submit a report of survey results for Owner and Structural Engineer of Record (SEOR) approval.

DGS should hold construction contractors accountable for any remediation and increased maintenance costs that will likely result from the contractor's failure to ensure specified concrete slab thickness was attained during placement.

Recommendation 6: Those professionals whose lack of diligence resulted in the pour strip construction deficiencies should be held accountable.

DGS should consider implementation of changes to guard against occurrence of such errors in future projects, for example:

- All shop drawings could be required to be submitted before the pre-installation conference occurs, or
- A pre-installation conference could occur with each new area covered by a recently approved shop drawing, or
- A Submittal Registry should project the number and identity of proposed shop drawings anticipated for all phases. (For example, if only one pre-installation conference occurs at the beginning of the Definable Feature of Work, part of the conference should identify the number of submittals that will be generated for Designer review for the phased construction. Then as construction proceeds discussion should occur whether each of those proposed submittals have been approved during the progress meetings.)

Recommendation 7: DGS should develop procedures to identify circumstances under which an independent peer reviewer should be employed to review and improve the design of unique and challenging construction projects. The trigger for a peer review could be the nature and complexity of the project design.

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Recommendation 8: DGS should develop procedures to identify circumstances under which an independent third party should be employed to serve as Construction Manager on an atypical construction project. The trigger could be a dollar value or uniqueness of the project.

DGS should develop protocols to ensure that controversial issues encountered/problems experienced by or with the construction contractors are promptly and effectively addressed. As an example, DGS could develop and incorporate into its contracts a systematic process that identifies deficiencies and withholds payments pending resolution. Once an item is identified as deficient, it would be added to a “rolling punch list” which is tied to payments. Therefore, the Contractor is motivated to correct issues in a timely manner. Foulger-Pratt Contracting (FP) generated their own internal contract compliance list, which was included and discussed at progress meetings, but evidently was not tied to payments.

Subsequent Event

On May 8, 2014, the County Chief Administrative Officer advised members of the County Council that the County Executive had directed County contractors to move ahead on remediation work at the Silver Spring Transit Center. That work would address the shear and torsion recommendations contained in the April 21, 2014 report commissioned by the County Executive entitled Report of the Independent Advisory Committee Regarding the Status of the Silver Spring Transit Center.

Summary of Chief Administrative Officer's Response

The response of the Chief Administrative Officer (CAO) to the final draft report is included in its entirety on page 55 of this report. The CAO addressed each recommendation individually in his response. The responses did not cause us to alter our findings or recommendations.

Chief Administrative Officer's Response



OFFICES OF THE COUNTY EXECUTIVE

Isiah Leggett
County Executive

Timothy L. Firestine
Chief Administrative Officer

MEMORANDUM

May 14, 2014

TO: Edward Blansitt, Inspector General

FROM: Timothy L. Firestine, Chief Administrative Officer *Timothy L. Firestine*

SUBJECT: Final Draft Report, Project Management Deficiencies in Constructing the Paul S. Sarbanes Silver Spring Transit Center

I am in receipt of your memo and final draft report dated April 15, 2014 detailing the review conducted by your office concerning the Silver Spring Transit Center. Your assessment of this issue has been thorough and fair. Please find below specific responses to your audit recommendations.

IG Recommendation 1: DGS should improve its controls for future projects in a manner that is consistent with the lessons learned and additional recommendations contained in Exhibit I, the report "Analysis of Project Controls," in addition to other recommendations made in this report.

CAO Response: This recommendation furthers the thesis of Alpha Corporation's Analysis of Project Controls report which largely states that implementation and refinement of project controls would have prevented many if not all of the construction deficiencies in the Transit Center. The report states, "Therefore, identification of controls that were omitted, deficient or failed is necessary to avoid repeating mistakes due to misplaced confidence in deficient controls." The County set forth specific Project Controls in the Contract Documents. Many of the controls evidenced in the report, particularly those that deal with concrete composition and placement, are clearly identified and set forth in the Contract Documents and place the responsibility for quality assurance and control measures on Parsons Brinckerhoff (PB), Foulger-Pratt (FP), and Robert B. Balter Company (Balter). Those contractors should have employed appropriate quality assurance and control measures to achieve more positive results. PB, FP, and Balter failed to impose quality assurance and control measures to ensure that the concrete complies with the Project requirements. The County agrees that it should continue to improve its project controls so that the mistakes made by the contractors on the Transit Center are not repeated in future construction projects.

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IG Recommendation 2: DGS should ensure construction documents clearly establish responsibility for and performance of systematic analysis of data collected and recorded during construction in order to identify possible inconsistencies with specifications, project control weaknesses, and construction deficiencies that should be investigated and resolved.

CAO Response: This section of the report focuses on the addition of excessive amounts of water to the concrete mixture and the subsequent lowering of the concrete compressive strength. FP was responsible for ensuring the composition of the specified and accepted concrete mix met Project requirements. Balter, as the testing agent, was required to inspect, test, and monitor the composition and placement of the concrete for the County. The Contract Documents are very clear on limiting water addition to the concrete mixture. FP and Balter were required to monitor and document the composition of the concrete. FP should have complied with the requirements of the Contract Documents and it should not have poured defective concrete. Balter should have noted the failure of FP to adequately ensure the composition of the concrete and it should immediately have alerted the County of the defective condition so that the County would have had the opportunity to stop the concrete pours until FP was prepared to place concrete that met with the requirements of the Contract Documents. On future complex construction projects, DGS will utilize the services of a Construction Management firm for greater oversight of all construction operations, thereby lessening the likelihood that similar problems will occur.

IG Recommendation 3: In future projects, DGS should ensure that all specification requirements are reviewed and implemented unless a variance is mutually discussed and agreed upon. Temperature limits during curing should be monitored and maintained, and specifications for duration of curing should be strictly observed. Confusion about where to take samples and about cold weather limits should be avoided by clearer language in specifications. Any conflicts between specifications and standards should be resolved in favor of the more conservative of those required by stakeholders (in the case of the SSTC, the stakeholders are DGS, and WMATA).

CAO Response: This section of the report addresses the requirements for cold weather curing and thermal protection as it relates to concrete placement. We agree that the controls are clearly identified and set forth in the Contract Documents. Further, we agree that the records collected by FP and Balter during the project clearly indicate that the details of curing concrete were not addressed in strict accordance with Contract Documents. The contract requirements and applicable building code requirements were clear and FP and Balter knew exactly what the cold weather curing and thermal protections were to be used for the pouring and curing of slabs. Nonetheless, both FP and Balter substantially ignored those requirements. It is clear that observations and evaluations by the County and its contractors and consultants could influence quality of future work. We agree that enforcement of the requirements of the Contract Documents

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serve to avoid or alleviate mistakes made by a general contractor and special inspector. On future complex construction projects, DGS will utilize the services of a Construction Management firm for greater oversight of all construction operations, thereby lessening the likelihood that similar problems will occur with cold weather curing and thermal protection.

IG Recommendation 4: DGS should modify its contract specifications for future construction projects to ensure that concrete test specimens are made as near as possible to the actual point where concrete is placed. Where referenced standards require testing at the point of delivery, DGS should clarify in the specification that such testing is in addition to typical testing.

CAO Response: This section of the report addresses the discrepancy of concrete sampling between the point of delivery and the point of placement. The requirements of the Contract Documents are clear in that the testing cylinders are to be made and stored as near as possible to the point of deposit. Balter failed to comply with the Statement of Special Inspections which references ASTM Standard C31/C31M that indicates that cylinders should be made and stored in or on the structure as near as possible to the point of deposit. It was Balter's responsibility as the special inspector to ensure that the test cylinders were made and stored as near as possible to the point of the concrete deposit. FP was also responsible to ensure that the cylinders were made and stored as near as possible to the point of deposit by construction contract specification section 03300.1.5.B which references ASTM C94. Therefore, we do not agree with this recommendation. The requirements are set forth in the applicable building and material codes as well as set forth in the Contract Documents. Thus, no ambiguity existed in this Project. Balter and FP ignored the applicable standards and the requirements of their respective contracts. On future complex construction projects, DGS will utilize the services of a Construction Management firm for greater oversight of all construction operations, thereby lessening the likelihood that similar problems will occur with concrete sampling.

IG Recommendation 5: In future projects, DGS should ensure its construction contractors utilize a construction method that allows direct measurement of floor thickness so that inspectors can help the Contractor by identifying problems before the concrete is placed. Alternatively, a second, independent survey should be performed. Survey equipment could be utilized by inspectors to continuously monitor concrete thickness during placement, and submit a report of survey results for Owner and SEOR approval.

DGS should hold construction contractors accountable for any remediation and increased maintenance costs that will likely result from the contractor's failure to ensure specified concrete slab thickness was attained during placement.

Chief Administrative Officer's Response

Edward Blansitt, Inspector General
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CAO Response: This section of the report addresses the issue of slab thickness. The Contract Documents specified a dimension for the slab thickness. We agree that FP should have utilized a method that ensured direct measurement of the floor thickness. We further agree that we should hold FP accountable for any remediation and increased maintenance costs that will likely result from FP's failure to ensure specified concrete slab thickness. On future complex construction projects, DGS will utilize the services of a Construction Management firm for greater oversight of all construction operations, thereby lessening the likelihood that a similar problem with slab thickness would occur.

IG Recommendation 6: Those professionals whose lack of diligence resulted in the pour strip construction deficiencies should be held accountable.

DGS should consider implementation of changes to guard against occurrence of such errors in future projects, for example:

- All shop drawings could be required to be submitted before the pre-installation conference occurs, or
- A pre-installation conference could occur with each new area covered by a recently approved shop drawing, or
- A Submittal Registry should project the number and identity of proposed shop drawings anticipated for all phases. (For example, if only one pre-installation conference occurs at the beginning of the Definable Feature of Work, part of the conference should identify the number of submittals that will be generated for Designer review for the phased construction. Then as construction proceeds discussion should occur whether each of those proposed submittals have been approved during the progress meetings.)

CAO Response: This section of the report addresses the pour strips. We agree that the control measures in place should have prevented the construction deficiencies in the pour strips on Level 330. While we agree with the recommendation that we should hold FP and PB accountable for the pour strip construction deficiencies, we believe that Balter also bears responsibility for its failure to account for the omission of post-tensioning cables in that location.

IG Recommendation 7: DGS should develop procedures to identify circumstances under which an independent peer reviewer should be employed to review and improve the design of unique and challenging construction projects. The trigger for a peer review could be the nature and complexity of the project design.

CAO Response: This recommendation proposes that an independent peer reviewer be employed for unique and complex construction projects. Note that this project was designed during the period that pre-dated the formation of DGS as a department in the

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County's government. Since then, the practice of independent peer review for large, complex, or unique projects has become much more commonplace. DGS frequently employs independent peer review on these types projects that feature project review by an independent team. This has had a decidedly positive effect on those projects.

IG Recommendation 8: DGS should develop procedures to identify circumstances under which an independent third party should be employed to serve as Construction Manager on an atypical construction project. The trigger could be a dollar value or uniqueness of the project.

DGS should develop protocols to ensure that controversial issues encountered/problems experienced by or with the construction contractors are promptly and effectively addressed. As an example, DGS could develop and incorporate into its contracts a systematic process that identifies deficiencies and withholds payments pending resolution. This "rolling punch list of deficiencies" control would address construction issues. Once an item is identified as deficient, it would be added to a rolling punch list which is tied to payments. Therefore, the Contractor is motivated to correct issues in a timely manner. FP generated their own internal contract compliance list which was included and discussed at progress meetings, but evidently was not tied to payments.

CAO Response: This recommendation proposes the use of a construction manager for a project like the Transit Center. Since the formation of DGS, the use of construction management expertise has been increasingly emphasized. We agree that were the Transit Center's construction begin today, DGS would use a construction management firm. DGS has currently prepared a solicitation to select construction management firms to be used on future projects.

If you have any questions, please feel free to contact me or Assistant Chief Administrative Officer Fariba Kassiri, who can be reached at (240) 777-2512 or Fariba.Kassiri@montgomerycountymd.gov.

TLF:dd

cc: Fariba Kassiri, Assistant Chief Administrative Officer
David Dise, Director, Department of General Services
Marc Hansen, County Attorney
John Markovs, Deputy County Attorney

Project Management Deficiencies in Constructing the Paul S. Sarbanes Silver Spring Transit Center

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Presentation of the Report to the Montgomery County Council
Government Operations & Fiscal Policy Committee

January 22, 2015



MONTGOMERY COUNTY MARYLAND

OFFICE OF THE INSPECTOR GENERAL

Project Management Deficiencies in Constructing the Paul S. Sarbanes Silver Spring Transit Center

Report at a Glance

Project Controls Weak or Ineffective

- Design
- Implementation
- Effectiveness

Deficiency with 14 of 22 controls
Alpha Corporation Subject Matter Expert Report

Compressive Strength

Addition of Water

Test specimens indicate more water
at end of pour than beginning

Cold Weather Curing

- Incorrectly Implemented
- Protection not maintained
- Temperature maintenance and monitoring

Concrete cured outside
acceptable tolerances

Test Specimens Not Representative of In-Situ Concrete

Primary test specimens did not
capture impact of water & cold

Contract Requirements Not Met

Deficiencies Not Detected

Concrete Placement

- Thickness not uniform
- Early identification
- Unresolved

Insufficient reinforcement cover evident
November 2010: Pour process never modified

Pour Strip Construction Deficiency

- Drawing submittal process weak
- Professional error

No control to identify expected shop drawings
Drawing omissions not detected by reviewers

Thermal & Flexural Design Issues Identified Early Into Project

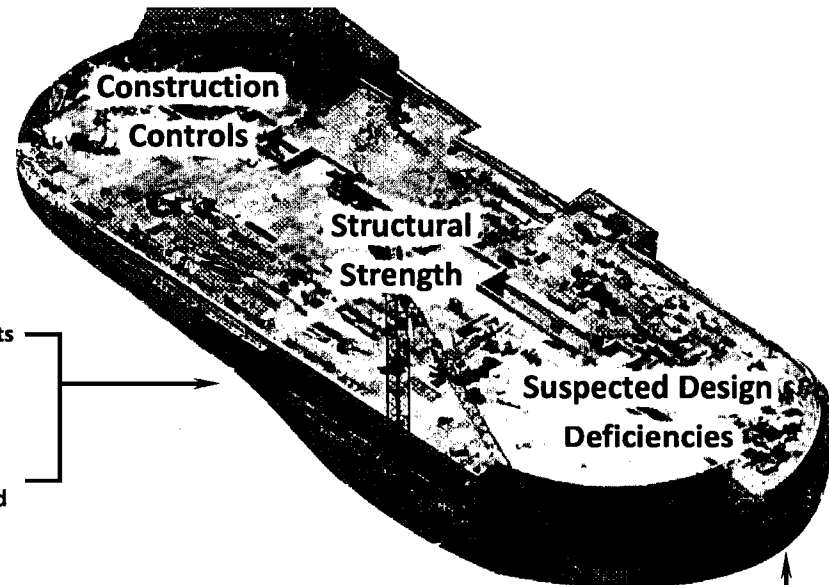
- Directed to Structural Engineer of Record to resolve
- Cracking persisted throughout all stages of construction

Structural Design & Construction Problems Not Effectively Addressed by Project Management

- Repeatedly addressed at stakeholder meetings
- Not addressed effectively

Despite early detection of cracking, project
management did not effect correction

Project management responsibilities
distributed among multiple stakeholders



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Project Management Deficiencies in Constructing the Paul S. Sarbanes Silver Spring Transit Center

Weak or ineffective project controls

- project controls used during the construction of the SSTC evaluated by Subject Matter Expert, Alpha Corporation
- deficiencies identified in KCE and WDP reports related to 14 weak or ineffective controls out of 22
- could and should have directly controlled the construction activities

Control	Deficiency Observed in Control			Effectiveness	No
	Design	Implementation	Effectiveness	Unknown	Deficiency
Pour Strips					
RFIs & Meetings			✓		
Submittal Review		✓	✓		
Pre-Installation Conference	✓		✓		
Daily Reports			✓		
Concrete Composition					
Pumped Concrete Samples	✓		✓		
Batch Plant Inspections	✓	✓	✓		
Concrete Mix Design					✓
Water Added at Site			✓		
Slump Measurements	✓				
Cold Weather Curing	✓	✓	✓		
Surface Curing	✓	✓			
Entrapped Air					✓
Entrained Air		✓		✓	
Concrete Placement					
PT Tendon Placement			✓		
Steel Rebar Placement		✓		✓	
Floor Thickness	✓	✓	✓		
Post Tensioning					
Stressing Records					✓
Concrete Stresses	✓	✓	✓		
Grout Strength		✓		✓	
Time to Grouting		✓		✓	
Strength at Stressing	✓				
Age at Stressing					✓

(1)



Project Management Deficiencies in Constructing the Paul S. Sarbanes Silver Spring Transit Center

Data Documenting Deficiencies Existed – Was Not Analyzed

- Routine construction records documented construction & control deficiencies
- Available to all stakeholders
- Evidenced deficiencies that should have been investigated as to cause(s)
- Though not a requirement, available data, if analyzed, could have identified deficiencies
- Known deficiencies were not effectively corrected

Image 9: Silver Spring Transit Center Construction Progress – December 2, 2010

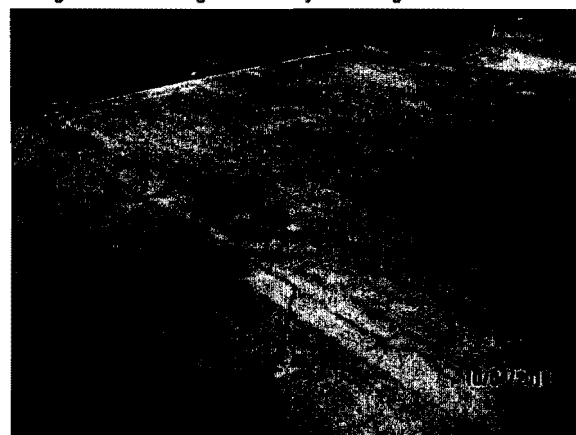


9:56 am on 2 Dec 2010

(img_3024.jpg)

Source and courtesy of the Montgomery County Maryland Department of General Services.

Image 8: Slab Cracking Evident 2 Days Following Placement of Pour 1B



12:41 pm on 4 Oct 2010

(img_2239.jpg)

Source and courtesy of the Montgomery County Maryland Department of General Services.

"The County will be looking to you as the SER to provide us the guidance in this issue. We all are sensitive to keeping with schedule, but that should not keep us from doing what is right for the long term of the facility."

Donald Scheuerman, Jr., Chief, Project Management Section, DGS
October 28, 2010



Project Management Deficiencies in Constructing the Paul S. Sarbanes Silver Spring Transit Center

Independent Construction Manager

- An independent construction manager should have been employed
- Oversee project from planning to completion
- Ensure requisite course corrections are made early upon discovery

SSTC "Construction Management" Responsibilities as Performed

Construction Management Element	Foulger Pratt	Parsons Brinckerhoff	Baker	MontCo DGS
Conduct & Document Periodic Progress Meetings		✓		✓
Document Control	✓			
Cost Tracking & Management				✓
Evaluation of Payment Requests				✓
Change Order Management	✓			✓
Quality Management	✓			
Review Daily Quality Control (QC) reports				✓
Complete Daily CM Log	✓			
Schedule Control	✓			
Review and verify contractor's project record drawings are updated		✓		
Monitoring Contractor Safety	✓			
Conduct inspections			✓	
Issue inspection deficiency letter to the contractor		✓		

Source: OIG Staff Analysis



Project Management Deficiencies in Constructing the Paul S. Sarbanes Silver Spring Transit Center

Key Elements of the OIG Report Recommendations

Construction Standards and Controls – *Independent Construction Manager*

- Control design and selection among conflicting standards were not the most appropriate for the circumstances
 - CM should ensure that selection is not just the most expedient and easiest to implement
- Too many entities: “*When everyone is in charge, no one is in charge*”
- Failure to resolve issues before proceeding with construction
 - Analyze all available data to identify and resolve issues before proceeding with construction (e.g. – Post Tensioning)

Unresolved Design Concerns – *Independent Peer / Constructability Review*

- Failure to resolve issues before proceeding with construction



Project Management Deficiencies in Constructing the Paul S. Sarbanes Silver Spring Transit Center

Ongoing OIG Activity

- Comparison of construction contractor original proposals
 - Review changes in project cost due to Change Orders, Field Orders, and additional contracts
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